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ABSTRACT

This document contains three papers from a symposium on core directions in human resource development (HRD). In "Expertise: The Development of an Operational Definition for Human Resource Development" (Richard W. Herling), expertise is defined as consistent demonstrated actions that are efficient in their execution and effective in their results. "A Methodology for a Cross-disciplinary Critique of Research" (Richard J. Torraco) includes the following phases: problem formulation, population selection, study selection, data analysis, cross-disciplinary synthesis, and reporting of results. "Economics of Human Resource Development--Literature Review" (Eunsang Cho) examines the implications of the following for HRD: human capital theory, screening theory, efficient wage model, internal labor market, agency theory, and transaction cost. (KC)

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28 Core Directions in HRD

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Expertise: The Development of an Operational Definition for Human Resource Development

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A Cross-Disciplinary Critique Of Research With Implications For HRD

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Economics of Human Resource Development-Literature Review

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ACADEMY OF HUMAN RESOURCE DEVELOPMENT

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Expertise: The Development of an Operational Definition for Human Resource Development

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Regardless of which side of the learning verses performance philosophical fence one chooses, the HRD professional cannot be successful in the development of an organization's human resources without the ability to quantify human expertise. The actual measurement of expertise has never been fully defined, but through a basic understanding of the characteristics of expertise it is possible to formulate an operational definition for application in the field of HRD.

The Recognition That Employee Competence is No Longer Enough

The *human competence base* and how it is developed is "beginning to make sense" to organizations as they start to realize how market value increasingly relies on the knowledge and skills of the organization's employee base (McLagan, 1997, p. 40). This potential to use specific sets of knowledge and skills is what Jacobs (1997) defines as "employee competence" (p. 280), and through the use of any number of analysis tools and methodologies available for identifying the knowledge, skills, and attitudes required by an individual for competent performance (McLagan, 1997; Jacobs & Jones, 1995; Rummler & Brache, 1995; Swanson, 1994), a competent work force is well within the grasp of any organization . But competence is not enough. Today, it is the development of workplace expertise (human expertise) that is of importance because "business success increasingly hinges on an organization's ability to use its employee's expertise as a factor in the shaping of its business strategy" (Torraco & Swanson, 1995, p. 11).

Competence only suggests that an employee has an ability to do something satisfactory, not necessarily outstandingly, or even well. As modeled by the taxonomy of performance (Swanson, 1994, p. 57), the "expertise" required to change a system is significantly different from the knowledge and skills required to maintain a system. Most organizations now recognize that change is inevitable, and that the individual who can work in a complex changing organization is invaluable. As a result, organizations are requiring that employees be top performers, to be more flexible, and to be able to adapt to the "constantly changing world of new strategies, customer requirements, and competitive maneuvers" (McLagan, 1997, p. 45). In short, it is the development of workplace expertise, not competence, that is vital to optimal organization performance.

The Need for an Operational Definition of Expertise

One way the HRD profession can contribute to improving an organization's performance is through "the development and/or unleashing of human expertise" (HRD faculty of the University of Minnesota, 1994). It is widely recognized that the performance of an organization can be evaluated and addressed at three levels – organization, process, and individual job performer – (Rummler & Brache, 1995; Swanson, 1994), and that the primary tool for linking the three levels of performance together is measurement.

Rummler and Brache (1995) argue that "without measures we don't get the desired performance" (p. 135) and that it is only through measurement that performance can be monitored, managed, and improved. Swanson (1994), in a more direct manner, simply notes that "it is foolhardy to talk about development, change, and performance improvement without specifying the measure of performance" (p.53). Thus, logic dictates that the quantification and measurement of expertise is necessary for the enabling of an organization to improve its performance and the performance of its human resources.

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In the context of individual performance and human resource development, expertise is defined as "the optimal level at which a person is able and/or expected to perform within a specialized realm of human activity" (Swanson, 1994, p. 94). As a descriptive definition of human expertise this provides clarity and focus. Expertise is generally thought of as the possession of superior skills or knowledge in a particular area of study. Expertise is also generally recognized as implying proficiency, with an understanding that the individual gains expertise, and thus proficiency, only through experience and training.

Although the actual measurement of expertise has never been fully defined, the importance of quantifying expertise has long been recognized. The general level of expertise possessed by an individual is readily observable through his or her actions and this ease of recognition has promoted misdirected attempts to quantify human expertise; the classification and re-classification of individual *levels of expertise* (Jacobs, 1997; Hoffman, Shadbolt, Burton, & Klein, 1995; Bereiter & Scardamalia, 1993). Unfortunately the classification of human expertise, without the ability to quantitatively measure expertise, has limited utility.

The Search for an Operational Definition of Expertise

To be able to quantify expertise one must first be able to operationally define what expertise is. Entire books, and complete chapters, have been written in response to the question (Chi, Glaser, & Farr, 1988; Slatter, 1990; Ericcson & Smith, 1991; Bereiter & Scardamalia, 1993; Swanson, 1994). The answers have been numerous and they can be categorized and discussed from several theoretical perspectives, including those of cognitive psychology and knowledge engineering.

In the process of developing an operational definition several assumptions will be made. The first of these being that expertise can be discussed in many forms, and that for the purposes of this paper, it is only human expertise that is of concern. The second assumption is that expertise is a journey, not a destination. There is a tendency when engaging in discussions on expertise to inadvertently interchange the two terms: expert and expertise. Expertise is the journey, an active process from which experts periodically emerge, which leads to the third assumption, that every person possesses some level of expertise.

A Summarized Review of the Cognitive Theories of Expertise All focused research on experts and expertise began with the study of chess players by deGoot in 1965. As summarized by Kuchinke (in press), in the fields of cognitive psychology and cognitive sciences the theories on experts and expertise have now transitioned to a third generation of thinking.

The first generation of research explored the individual's basic information-processing capabilities with the resulting "theories of problem-solving being stated in terms of the human information-processing system" and a search for general rules-of-thumb (Kuchinke, in press).

Second generation theories of expertise focused on complex problem-solving and the characteristics of experts as the key to human expertise, as opposed to generic methods of conceptualizing solutions to unique situations. The outcome of this refocused research effort, as summarized by Glaser and Chi (1988) and included in Kuchinke's (in press) update of the current theories and literature, was the identification of several key characteristics of experts. Each characteristic is associated with either how experts solve problems or how experts acquire, process, and retrieve information.

The third generation of expertise theory is still evolving. Based on a realization that there may be no single *expert way*, current theory and research work is examining expertise as an "ability to rapidly organize and process small bits of information into meaningful and creative solutions to specific problems" (Kuchinke, in press).

A Summarized Review of the Knowledge Engineering Theories of Expertise While the cognitive sciences attempted to discover how an expert thinks and what was required to be an expert, knowledge engineering (KE) took a different approach. The focus of knowledge engineers is in the replication of human expertise. Through the processes of trying to create artificial intelligence, knowledge engineering has paralleled the work done in the cognitive fields. In the field of KE the evolution of expertise theory has resulted in five major model classifications of human expertise: heuristic models, deep models, implicit models, competence models, and distributed models (Slatter, 1990).

Expertise, as loosely defined by the *heuristic models*, involves the acquisition of lots of information, including heuristic knowledge, about a specific domain. The heuristic knowledge is

comprised of the know-how, the "rules-of-thumb", of a specific domain. In the heuristic models, expert problem-solving entails the extraction and application of domain specific information and heuristic knowledge.

Deep models advanced the general theory of expertise by suggesting that experts use a variety of deep knowledge structures (as opposed to the shallow knowledge structures emphasized by the heuristic models). It is believed that these deep mental models created by the domain expert result in better problem-solving, and provide better explanations of expertise then the ones bounded by the limitations of the heuristic models.

Implicit models attempted to explain expertise by differentiating between implicit knowledge and explicit knowledge. Explicit knowledge is defined as the combination of shallow and deep knowledge, while implicit knowledge is representative of the "nonarticulable experience-base knowledge that enables a skilled expert to solve a task in an effortless, seemingly intuitive fashion" (Slatter, 1990, p. 141).

Competence models make a distinction between domain knowledge (static knowledge) and task knowledge (action knowledge). The implication being that expertise is a competence-level term denoting the potential for doing something. This approach recognizes that experts know a great deal about a specific domain and that experts use this knowledge to effectively solve problems. The task knowledge, which is gained from the practice of domain specific behaviors, is compiled by the expert with his or her domain knowledge in an ongoing search for better ways to do things, including problem-solving.

The fifth class of KE expertise models, *distributed models*, equate expert knowledge as a combination of domain knowledge, task knowledge, and cooperative knowledge (knowledge about how one communicates and interacts with others). The underlying assumption of distributed models is that, in a complex technological society, the expertise needed to solve a problem may be distributed among many individuals. Consequently, these models are more concerned with what an expert must know to cooperatively solve problems with others.

An Examination of the Elements of Expertise as a Means of Defining Expertise

Despite thirty years of advancing research on the topic, no single operational definition of expertise exists. Even though a large body of knowledge has been, and continues to be, added to our understanding of the nature of expertise by the cognitive psychologists, cognitive scientists, and knowledge engineers through their research into the domain of expertise, they have been unable to provide a single unified response to the posed question: What is expertise?

Kuchinke's (in press) review of the expertise theories, and Slatter's (1990) summary explanation of the KE expertise models, have shown through a lack of consensus, that human expertise can not be operationally defined by its processes. While the lack of a definition is disappointing, the combined summary has brought to light several common, or shared, elements in the various theories of expertise. Briefly stated as foundational concepts of expertise, these shared elements are (1) expertise is a dynamic state, (2) expertise is domain specific, and (3) the basic components of expertise are knowledge, experience, and problem-solving.

The most important concept of human expertise is that it is a dynamic state. Expertise is seen by the theorists as an internal process of continuous learning by the individual; a constant acquisition of knowledge, reorganization of information, and progressive solving of problems. The importance of recognizing expertise as a dynamic state lies in the realization that a person never stops acquiring expertise. Bereiter and Scardamalia (1993) summarized the dynamic characteristic of expertise in their descriptive comparison of experts and non-experts. The "career of the expert is one of progressively advancing on problems constituting a field of work, whereas the career of the non-expert is one of gradually constricting the field of work so that it more closely conforms to the routines the non-expert is prepared to execute" (p. 11).

The second shared element, that of expertise being domain specific, may have the most impact on the future creation of programs designed to develop expertise in individuals. How significant is this second foundational concept? Research indicates that "there is little evidence that a person highly skilled in one domain can transfer the skill to another" (Glaser & Chi, 1988, p. xvii). The demonstration of expertise in one domain is no guarantee of expertise in other areas, however, it may be that "certain task domains are more generalized then other areas, such as applied mathematics" (Glaser, 1985, p. 7). Cognitive psychologists have theorized that "there are some domains where nearly everyone becomes an expert, like reading English words" (Posner, 1988, p. xxxi). Never the less, the majority of research suggests that extensive, specialized knowledge is "required for excellence in most fields" (Gleespen, 1996, p. 502).

The basic components of expertise was the third foundational concept highlighted by the review of the expertise models and theories. While there was not always agreement among the researchers as to which component took precedence, all identified in some manner knowledge, experience, and problem-solving as being the distinguishing points of difference between experts and non-experts. These three common elements can be viewed as the fundamental components of human expertise, and it is reasonable to expect that from this third foundational concept that an operational definition of expertise can be developed. Based on the commonalty of the three components human expertise could be defined as a combination of domain specific knowledge, experience, and problem-solving skills.

An operational definition, like a theory, must have utility, simplicity, and coherence (Gilbert, 1978, p. 3). As a possible operational definition this posed definition of expertise has simplicity, and in its conceptual application appears to have utility. However, to validate the proposed definition a closer examination of each of the three components is required.

The component of knowledge. Knowledge appeared in every reviewed theory and model of expertise, and in almost every case it was either descriptively different, or there were multiple types of knowledge specified.

Depending upon the theories or models being examined, the knowledge required for expertise could be implicit, explicit, shallow, deep, heuristic, domain knowledge, task knowledge, and/or cooperative knowledge.. Bereiter and Scardamalia (1993) noted that "every kind of knowledge has a part in expertise" (p. 74). Their definition for "every kind of knowledge" included what they classified as the obvious kinds of knowledge – procedural knowledge and formal knowledge – as well as what they referred to as the less obvious kinds – informal knowledge, impressionistic knowledge, and self-regulatory knowledge.

While there may be some disagreement among the theories and models regarding the specific type of knowledge required for expertise, the theorists are in agreement on two points. First, that for the purposes of expertise, knowledge is, and has to be, domain specific. Second, that knowledge is an interactive component of expertise, one of the requirements for expertise, but not expertise in itself. As noted by Bereiter and Scardamalia (1993), non-experts as well as experts have knowledge, "the difference is in how much they have, how well integrated it is, and how effectively it is geared to performance" (p. 74).

The component of experience. The second common component gleaned from the theories of expertise is that of experience. Just as it is recognized that all experts are knowledgeable, it is also understood that all experts are experienced. Based on their studies of master chess players (Chase & Simon, 1973: as cited in Posner, 1988), "to achieve a master level of expertise a player had to spend between 10,000 and 20,000 hours staring at chess positions" (p. xxxi). A number of years later, through the studied biographies of experts in many fields, Hayes generalized that 10,000 hours was the amount of time required to gain expert experience (cited in Bereiter & Scardamalia, 1993, p.17). Thus it has been hypothesized from the research, but not verified, that to become an expert one must have the equivalent of 10 years of combined studies and related experience.

Based on the experience component of expertise, the important question would seem to be not what is expertise, but rather what can be done to speed up the process of acquiring expertise. Taking actions in this direction, however, would be premature for two reasons. First, the term experience, like that of expertise, is a term of varied meanings currently lacking qualifying and quantifying boundaries. Second, when related to expertise, and specifically to the development of human expertise, experience (like knowledge) is an interactive component of expertise and is heavily dependent upon the type and quality, as well as the quantity, of the events experienced by the individual. As Bereiter and Scardamalia (1993) observed in the performance of equally experienced school teachers, the training received and the number of years worked experience "distinguishes old-timers from beginners, but does not distinguish experts from experienced non-experts" (p. 81).

The component of problem-solving. The key to expertise thus appears to lie in the third component, an individual's propensity to solve problems. The knowledge engineers, in attempting to replicate the process of applying expertise, have viewed problem-solving as the core concept of expertise. The concept of problem-solving as the primary component of expertise has also been heavily supported by the research of cognitive psychologists and scientists, as summarized by Robert Glaser in his *Thoughts on Expertise* (Glaser, 1987: as cited by Chi, Glaser, & Farr, 1988), and Bereiter and Scardamalia (1993) took the emphasis on this concept one step farther by describing problem-solving as the dynamic element in the growth of expertise.

Problem solving, as the term is currently used in cognitive psychology, constitutes some amount of searching and/or deliberation in order to find a way to achieve a goal, a concept that defines a problem as any non-routine purposeful activity (Bereiter & Scardamalia, 1993).

Wertheimer, an early gestalt psychologist whose studies centered on insightful learning, focused on the abilities required by the individual to solve problems effectively. In his book *Productive Thinking*, Wertheimer placed the emphasis on the type of solution used for solving a problem rather than on the problem itself. Wertheimer identified two types of solutions: Type A solutions in which there is originality and insight, and Type B solutions in which old rules are applied (Hill, 1971). Wertheimer believed that both types of solutions depended upon the previous experience of the problem-solver, noting that "the prime difference was in the originality used by the problem-solver to organize information," a characteristic unique to Type A solutions (Hill, 1971, p.102). Applying Wertheimer's theory of problem-solving to the concepts of human expertise it can be reasoned that understanding implies not merely a logical correctness, but a perception of the problem as an integrated whole, which in turn leads to an insightful solution.

Wertheimer's concepts of *real understanding and insightful solutions* can be seen at the core of Bereiter and Scardamalia's (1993) comparison of expert and non-expert problem-solving. Experts are progressive problem solvers while "the problem-solving efforts of the non-expert is taken over by well learned routines ... aimed at eliminating still more problems thus reducing the activity even further" (p. 81).

A Proposed Operational Definition of Human Expertise

From this examination of the components of expertise it can be seen that non-experts can have vast amounts of knowledge, non-experts can have many years of experience, and non-experts can also solve problems. While the posed definition of expertise as a combination of knowledge, experience, and problem-solving has simplicity and utility, it can be seen that attempting to define expertise by its components fails to meet the criteria of coherence. A final option is to attempt to base the formulation of an operational definition on the characteristics of displayed behavior. This approach carries a degree of practicality with it as the presence of expertise is readily recognized in an individual's actions.

Defining Human Expertise by the Characteristics of Displayed Behavior Experts are capable of doing things at a higher level, have more knowledge, a greater skill level, and better solutions (VanLehn, 1989). The expert-novice research of different occupations has verified that this is true (Glaser & Chi, 1988; VanLehn, 1989; Ericcson & Smith, 1991). But, the research itself has been driven by the recognized fact that there were observed differences in the displayed behavior of individuals engaged in the same activities. Thus the concept of "demonstrated behavior" must be found at the core of an operational definition of human expertise.

Performance as a displayed characteristic of an individual's actions. Behavior, as applied to the discussion of human expertise, implies an intended behavior, or action, on the part of the individual, and an action has a consequence, it terminates with a result. Results, and the actions which lead to them, are measurable. Gilbert (1978) stated that the result of behavior should be viewed in the context of value, "the consequence as a valuable accomplishment," a "valuable performance" (p. 17). Gilbert defined individual performance with the aid of a mathematical formula (Performance = Behavior → Consequence), equating individual performance to a transactional relationship involving both a behavior and its consequence (p. 16).

Performance, especially a valuable performance, can be assessed in terms of time, quality, quantity, and ultimately, cost. Performance can be quantified as a comparison of the value of the result to a predetermined standard. The measurement of performance can be applied to the individual, process, or organization (Rummler & Brache, 1995; Swanson, 1994), and at the individual level, performance is representative of the effectiveness of the consequences of an individual's intended behavior, or actions.

Competence as a displayed characteristic of an individual's actions. Morf (1986) operationalized a definition of individual performance, by stating that it "is a function of the interaction of the person and the work environment" (p. 113). Morf reduced his definition of individual performance to the formula Performance = Competence x Work Environment, claiming that his formula demonstrated a relationship between the three unobservable constructs, thereby "help(ing) to structure and explain the chaotic and confusing empirical world around us" (p. 111).

The purpose here is not to debate the validity of such a formula, but too only show it as evidence that some type of relationship exists between individual performance, competence, and expertise.

Morf (1986) defined the variable Competence as the product of "the worker's motivational dispositions and abilities that are relevant in the context of work" (p. 15). This is a key point as Morf based his performance theory/formula on the premise that "the aspect of the worker most frequently influenced by performance is ability levels," which Morf equated to the "new skills developed and new knowledge acquired in the very process of doing a job" (p. 14). In other words, the key element in Morf's formula for performance is expertise.

Gilbert, in his book entitled *Human Competence* (1978), discussed the concept of human competence and individual performance in depth. Unlike Morf, Gilbert saw competence not as a component of performance, but as a function of "worthy performance" expressed as "the ratio of valuable accomplishments to costly behavior (Worthy Performance = Valuable Accomplishment / Costly Behavior)" (p. 18). In Gilbert's mind *competent people* where those individuals who could create valuable results without using excessively costly behavior. The quantified term, competence, was used by Gilbert as the measure of efficient behavior, and his standard of competence was "exemplary performance". Gilbert qualified exemplary performance as the "historically best instance of performance" (p. 30), stating that "exemplary performers do things more easily than others do them" (p. 40).

The worthy performance of Gilbert's (1978) competent individual, the exemplary performer, can be shown to be a product of the work environment and the individual's *repertory of behavior*. Gilbert's explanation of a person's repertory of behavior highlighted specialized responses, knowledge, and an understanding of a specific area (p.75), and emphasized the need to recognize that "knowledge deficiencies were the most important problems of behavior repertory" (p. 107). In short, Gilbert has identified experts (exemplary performers) and expertise (repertory of behavior) as the standard and the key element of competence, respectively.

Competence can thus be seen as a displayed characteristic of expertise, not as expertise itself but as very behavior specific, definable, and measurable subsets within an individual's domain of expertise.

The Formulation of an Operational Definition of Human Expertise Through the examination of the characteristics of individual performance and competence, as measures of effective and efficient behavior, the remaining pieces of the definition of human expertise have been uncovered. As previously noted, we recognize expertise in others by their demonstrated actions. Expanding upon this observation: we recognize experts as those individuals who do things better than anyone else. Experts, in their area of expertise, demonstrate their acquired expertise through outstanding performance. Based on the preceding discussions, this means that experts can consistently do things more effectively and efficiently than non-experts.

Human expertise can thus be operationally defined by these two desired characteristics of displayed behavior as *the consistent demonstrated actions of an individual which are both efficient in their execution and effective in their results*. In short, human expertise is the ability of the individual to consistently do the right thing in the right way.

However, before completely accepting this definition of human expertise a question may be raised regarding the lack of, and/or need for, a reference to outstanding performance and the associated expectation that it readily observable within the domain of expertise as well as periodically seen in related domains. One can not deny the importance of the level of expertise achieved by some individuals, but outstanding performance is a descriptive characteristic of the desired destination, not of the journey. The intent of this paper was not to define, identify, or quantify the term of expert, the intent was to develop an operational definition of human expertise, and the definition being developed fulfills that intent.

The Implications for HRD

Despite whether one chooses to view expertise as an output of learning or as an input to performance, an operational definition of human expertise, a definition which has simplicity, utility, and coherence, gainfully positions the HRD professional with a better understanding of the requirements for the development of the organization's human resources.

The implications of this conceptual approach to human expertise are many and varied. To begin with, such an unpretentious definition of expertise may be difficult to accept. In fact,

the argument could be presented that the definition just proposed is not one of human expertise, but rather a definition of human competence. At a first glance this would appear to be true, after all an individual must first possess a minimum degree of expertise in some area to be able to demonstrate competence in that area.

Continuing along this line of thought, it would appear that the proposed operational definition of human expertise could be the kindling for a fiery debate between which is better, expertise or competence? This would have to be considered a foolish debate, a classic comparison of apples to oranges. While clearly linked, and unquestionably similar in nature, expertise and competence are distinctly different.

As previously noted, competence can be visualized as subsets of expertise. In other words, competence is displayed to others as effective and efficient actions, but very task specific actions and therefore found within an individual's domain of expertise and not encircling it.

As a second point, competence, with its primary goal being efficient action, is both narrowing by nature and static, unlike expertise which is dynamic and expanding. Competence is seen and described as a desired outcome (McLagan, 1997), the destination; while expertise is clearly a process (Bereiter & Scardamalia, 1993), the journey.

A third and final point, competence is limited to a very specific domain, the individual's area of expertise, while expertise, also recognized as domain specific, is not limited to a single domain but often extends into several related domains.

At a more practical level, the proposed operational definition of human expertise allows the HRD professional to quantify human expertise, which in itself has some significant implications to HRD. It has always been understood that the acquisition of expertise required study, practice, and experience, what was never clear was how much of each was needed. The result of this lack of understanding has been a "more-is-better" approach to providing training. The proposed operational definition of human expertise, coupled with the analysis tools currently available to the HRD professional, allows experts within the organization to be benchmarked in qualitative and quantitative terms. This in turn permits the development of focused training programs designed to accelerate the acquisition and transfer of expertise.

The downside of being able to quantify human expertise is that there will be a desire and tendency by some representatives of the HRD profession to create a work force of experts. An organization's training resources should be focused on programs designed to raise the individual's, and ultimately the organization's, overall level of expertise, and not for developing experts. Experts are self-motivated and self-monitoring (Bereiter & Scardamalia, 1993; Glaser & Chi, 1988), they develop automatically (Glaser, 1985). The purpose for benchmarking experts should be to establish appropriate standards for competence, and as a result, the focus of training should be to develop the competence required to maintain and support the processes of the organization.

The need to quantify and measure expertise can be associated with the concept of expertise being at the core of performance. *The danger to the organization lies in electing to develop experts instead of expertise.* Rummler and Brache (1995) emphasize that, while failure to measure the right things results in no performance improvement, choosing to measure the wrong things (or measuring the right things for the wrong reasons) results in a loss of performance.

Conclusion

Human expertise is clearly a complex, multifaceted phenomenon, but by the means of an operational definition, expertise can be expressed in measurable terms. Human *expertise* is defined as:

> displayed behavior within a specialized domain and/or related domain in the form of consistently demonstrated actions of an individual which are both *optimally* efficient in their execution and effective in their results.

Human competence, a related construct and component of expertise, can also be expressed in measurable terms. Human *competence* is defined as:

> displayed behavior within a specialized domain in the form of consistently demonstrated actions of an individual which are both *minimally* efficient in their execution and effective in their results.

Through the use of an operational definition of expertise and the recognition of domain specific knowledge, experience, and problem-solving as being the elements of human expertise, the HRD profession gains access to one of the most powerful tools for improving performance: human expertise.

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A Methodology for a Cross-disciplinary Critique of Research

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Human resource development, as a young social science discipline, benefits from critical self-examination and from learning from the experiences of other, more mature social sciences. In this study, the spirit of improvement through critique is applied to HRD research. A methodology is presented for the cross-disciplinary review and critique of research in HRD and other social sciences. The methodology supports cross-disciplinary analysis of research and provides a criterion-based system for improving HRD research.

Can HRD research be improved? Could the issues selected for study and the methodological rigor of HRD research be done more effectively? Is there room for improvement in the scope, generalizability, and theoretical and practical importance of HRD research?

The obvious answer is, of course improvement is needed in research. Scholars of most other disciplines would respond similarly if the same questions were posed to them. Thus, rather than ask, "in what areas can HRD research be improved?" a more compelling question is, "are there any areas in which HRD research is not in need of improvement?"

Research in HRD shows some remarkable strengths considering that HRD is one of the youngest fields in the social sciences. However, because it is such a young field, research in HRD has not had ample opportunity to mature. Older disciplines such as biology, physics, medicine, and engineering are still hard at work generating new basic and applied knowledge in the hopes of creating safer environments, improving quality of life, promoting health, and other desirable ends. Scientific advancement occurs by moving beyond what is known and accepted, and by taking a critical approach to resolving important new issues. It requires critical self-examination.

Since older social science disciplines have faced similar challenges in developing a substantive body of knowledge as HRD, their experiences can inform the ways in which HRD can strengthen its own research. This paper provides a methodology for the review and critique of social science disciplines including HRD. The methodology provides a basis for identifying the strengths of the related research traditions and for improving research in HRD practice.

The core research questions of the study are:

- Can the strengths of the research strategies of the other social science disciplines inform the further development of research in HRD?
- What methods are needed to critique research across related social science disciplines such as economics, sociology, management, and psychology?

The paper begins with a brief critique of research in HRD. Then, a process for conducting integrative research reviews across disciplines, developed for this study, will be described. Research in the fields of economics, sociology, management, and psychology will be reviewed. The strengths of the research strategies of each of the fields reviewed will be identified. Finally, these research strengths will be applied to HRD and recommendations will be made for how HRD research might be further developed by adopting these strategies.

A Critique of HRD Research

The following critique identifies areas in which improvement is needed in HRD research based on a brief review of HRD literature.

Research Lacks a Multi-disciplinary Approach. HRD research has always been parochial, limited to the examination of ideas and methods for learning, training, and individual and group development. Relative to research in the other social sciences review in this paper, the variables studied in HRD are generally limited to issue of learning, education, and training. This

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narrow focus exists despite the complex and multi-dimensional determinants of organizational success in today's business environment.

For example, Taylor's (1992) examination of the relationship between training implementation characteristics and the success of supervisory training was limited to the perception of training directors. Research findings that have been filtered through training professionals are anything but interdisciplinary and are of limited generalizability.

Studies Are Limited to Organizational Contexts. Few studies examine human resource development in communities, industries, and other populations beyond the organization setting. Research in sociology, psychology, and economics takes a broader view of its study populations by including communities, cultures, regional, national, and even international perspectives. Why must the development of human potential as addressed by HRD be restricted to organizations? Private, Not-for-profit, community, non-profit, government, higher education

Outcome Measures Have Little Strategic Value. Few HRD studies use the organization's own measures of performance as the dependent variable. For example, Nowack's (1992) study comparing managers' self-ratings of the frequency of their behavior with the ratings of others was not tied to individual (forget organizational) performance outcomes. Kovach and Cohen's (1992) study related types of training to HR variables at the individual level (job satisfaction, pay, promotion, seniority, and projected organization tenure), but did not attempt to link training to performance outcomes. The outcomes studied by Taylor (1992) were training directors' perceptions of supervisors' reactions, learning, and behavior change resulting from supervisory training.

Although Guglielmino and Roberts (1992) found a significant positive relationship between self-directed learning readiness scores and job performance in two samples of telecommunication employees from the U.S. and Hong Kong, the implications of their findings were weakened because they relied on self-reports of job performance from respondents. Those in the best position to assess performance—customers, superiors, and co-workers—were not used to measure this variable.

Karl and Ungsrithong (1992) studied the effects of previews of training on outcome measures that were limited to self-reports by participants. Attitudes toward training, motivation to learn, and other participants' reactions to training were examined to determine the effects of training previews. To study the effects on transfer of training, subjects given different training previews were asked if they had tried to transfer the learning acquired in training. No attempt was made to ask others in positions to assess the subjects' behavior or performance change if these outcomes were achieved.

Imprecise Definitions of HRD Interventions. Research in HRD is frequently plagued by two problems with the definition of the intervention. The actual intervention is multi-dimensional (for example, including financial incentives and job skills training), and yet the intervention is considered "training." Another definitional problem is that the intervention is correctly identified as training, yet the research fails to account for the other changes in the workplace that inevitably affects performance. Most successful performance improvement efforts in organizations are a combination of related interventions. An example of imprecise definitions is Kovach and Cohen's (1992) study provided superficial definitions of three types of training. On-the-job, off-the-job, and refresher training were characterized without addressing their purposes, scope, or complexity.

Today's Research Addresses Yesterday's Problems. Witness the popularity among HRD researchers of overworked topics such as teams, self-directed learning, and the human toll of downsizing. Meanwhile, organizations have moved ahead to other issues. It is not that "yesterday's" topics are not important—each of these is worthy of study. Yet, a knowledge base has accumulated for these topics and the contribution of each new study is marginal. Why not focus on using what we know in each of these areas, rather than squeezing yet another concept out of extensively explored topics.

Nowack's (1992) study comparing managers' self-ratings of the frequency of their behavior with the ratings of others was a reexamination of yesterday's problem.

Rather than HRD researchers asking HRD practitioners about the "success" of training programs as Taylor (1992) did, HRD researchers should ask those in a better position to assess actual performance outcomes (i.e., line managers and employees) about the effectiveness of supervisory training!

The Need for Cross-disciplinary Research Review and Critique

Despite the advances in methods for conducting integrative research reviews, cross-disciplinary reviews of research are rarely reported in the literature. These reviews are important if related disciplines in the social sciences are to learn from each other. There are several reasons why such reviews are rarely reported. First, scholars generally spend their time conducting research within their own disciplines. There are enough voids in the theory and research of the social sciences to keep scholars busy within their own disciplines. Second, methods for conducting cross-disciplinary reviews have not been formalized. Only recently have the methods described above for a conducting review on a specific topic been developed. These methods have not been extended to research reviews across disciplines. Third, few truly cross-disciplinary forums for reporting such reviews exist. Most researchers have specific audiences in mind for their work and publish in specialized journals that best reach those audiences.

From Which Disciplines Can HRD Learn?

Because other fields face similar problems in advancing practice through research, the examination of the experience of other social science disciplines is helpful. Is there a particular social science with which a comparison to HRD would be most helpful? If so, with which one—psychology, education, management? Because researchers in psychology effectively use psychometrics to quantify relationships between variables of interest, much could be learned from this area to improve the precision of the definitions of variables studied in HRD. Similarly, there might be benefits to examining the research strategies of the field of management, where research is purposefully designed to study outcomes that have strategic value. Something could also be learned from the field of economics, which produces studies that apply across industries and populations on important topics such as shifts in jobs, occupations, and labor markets. Indeed, the research traditions of each of these fields—sociology, psychology, economics, and management—all have something of value to offer.

The fields of economics, sociology, management, and psychology offer HRD fertile lessons to improve research. Each has contributed significantly to the body of theory and research supporting HRD. Economics is the study of the allocation of scarce resources among competing needs (Samuelson, 1980). Human capital theory explains the potential economic benefits of human resource investments (Becker, 1964). Human capital theory is the primary basis for arguments that expenditures on education and training are justified on the basis of cost-effectiveness (Levin, 1987), utility analysis (Schmidt, Hunter and Pearlman, 1982), and cost-benefit analysis (Swanson and Gradous, 1988). Sociology included the study of social relationships and institutions, including the organizations within which HRD functions. Organizational sociology addresses issues of structure, communication, power, and influence at the level of the firm (Scott, 1994). Occupational sociology examines changing patterns of skills, roles, and work relationships within and across jobs and occupations (Attewell, 1992). Among the specialties within the field of management, organization behavior and human resource management have contributed substantially to the knowledge base of HRD.

Integrative Reviews as a Research Process

The cumulative knowledge in a field of inquiry is assessed by conducting integrative reviews of the theoretical and empirical literature. The purpose of integrative research reviews is to synthesize separate research findings into a coherent whole (Cooper, 1982). Integrative research reviews are used to verify and develop theory, assess substantive and methodological advances, synthesize knowledge, and generalize inferences from a set of relevant studies (Ellis, 1991). Thus, the inferences made in integrative research reviews are as important to the advancement of a discipline as those made in primary research (Light and Smith, 1971; Cooper and Hedges, 1994).

The integrative research review has been conceptualized as a research process in its own right that is separate from literature reviews that serve as background to new research activity. Guidelines promoting the same rigorous standards for research reviews that apply to primary research have been developed. In an early pioneering effort, Light and Smith (1971) suggested criteria for determining when data from dissimilar studies could be pooled. They proposed a method, called the "cluster approach," of combining the data of studies from which conflicting conclusions have been drawn to inform decision making in the social sciences. Taveggia (1974) observed that the findings of any single research study are probabilistic—they may have occurred simply by chance. He demonstrated that if a large enough number of studies are done on a particular topic, chance alone dictates that the studies will report inconsistent and contradictory findings. In arguing for a cumulative approach to interpreting research findings, he stated, "what appears to be contradictory may simply be the positive and negative details of a distribution of findings" (p. 398).

Jackson (1980) provided the first formal specification of the methodological tasks of the integrative research review and suggested ways in which more powerful and valid reviews might be done. Demonstrating the need for more rigor in research reviews, Jackson sampled 36 review articles and found only one that reported the indexes or retrieval systems used to locate primary studies. Cooper (1982) emphasized that research reviewers must pay the same attention to rigorous methodology that is required of those conducting primary research. He conceptualized the research review as scientific inquiry involving five stages that parallel those of primary research. Cooper described the functions, sources of variance, and potential threats to validity associated with each stage and developed a comprehensive methodology for how to conduct an integrative research review (Cooper, 1984; 1989; Cooper and Hedges, 1994).

In the early 1980's, a series of publications introduced meta-analytic methods for synthesizing research findings. Glass, McGaw, and Smith (1981) presented meta-analysis as a new application of analysis of variance and multiple regression procedures with effects sizes treated as the dependent variable. Hunter, Schmidt, and Jackson (1982) introduced meta-analytic procedures that (a) compared observed variation in study outcomes with that expected by chance and (b) corrected observed effect size estimates and their variance for known sources of bias (i.e., sampling error, unreliable measurements). Hedges and Olkin (1985) further elevated the quantitative synthesis of research to an independent specialty within the statistical sciences by summarizing a wide array of meta-analytic procedures and presenting a set of rigorous statistical proofs establishing their legitimacy.

Efforts were made to include descriptive and qualitative studies in integrative research reviews. In a work that advanced the use of research reviews to assist decision making in the social policy domain, Light and Pillemer (1984) emphasized the importance of using both qualitative and quantitative studies in research reviews. Summarizing the benefits of using both numerical and narrative information, they stated, "formal statistical analysis is often needed to identify small effects across studies that are not apparent through casual inspection. But qualitative analysis of program characteristics are necessary to explain the effect and decide whether it matters for policy" (p. 10).

Thus, methodological advances in integrative research reviews have been made. Comprehensive research reviews in a wide range of topics reflect these advances. Unlike reviews of research that focus on a discrete topic or domain within a discipline, the subject of this review is how a comparison of research strategies across disciplines can inform the development of research in HRD. The multidisciplinary scope of research addressed here is far broader than that of traditional reviews of research and requires a substantially new review methodology. Consequently, a new methodology was developed for conducting an integrative review of research across disciplines. The methodology was adapted from the work of Cooper (1989) and Ellis (1991). The six phases of this methodology are described next.

A Methodology for Cross-Disciplinary Research Reviews

The six phases of the review methodology are (a) problem formulation, (b) determining study populations, (c) selecting studies, (d) data analysis, (e) cross-disciplinary synthesis, and (f) reporting the results.

Problem Formulation. The design of a research review is based on the specification of a core problem to be resolved or a set of related hypotheses to be tested. The source of the problem to be addressed may be theory (i.e., verifying existing theories or developing new ones), the empirical research to be reviewed, prior research reviews, or a new problem to be addressed by research review rather than primary research (Jackson, 1980).

Defining key concepts and specifying the operations used to measure variables are a necessary part of stating the problem. Constructs central to the problem are first conceptually defined and then related to observable events through operational definitions. The key distinction between primary research and research reviews is in the specificity of definitions. While primary research typically involves a discrete operational definition for each concept, operational definitions serve a broader purpose when reviewing research. Operational definitions for concepts used in cross-disciplinary reviews of research must strike a balance between two opposing constraints. They must be precise enough to focus the research on studies of a particular kind, while being inclusive enough to allow selection of studies from several related disciplines.

Defining Study Populations. The major decision in data collection is determining the population of studies that will be the object of inquiry. Both primary and review researchers specify target and accessible populations for study and need to account for how these might differ from one another. Researchers conducting cross-disciplinary reviews must select the major disciplines of studies to be reviewed. Because most academic and professional disciplines have evolved into sub-specialty areas, reviewers are confronted with having to choose among many closely related specializations. Selection decisions are best justified on both theoretical and practical grounds. Reviewers of cross-disciplinary literature, especially those addressing new problems about which little has been written, must also decide whether or not to include opinion (non-scholarly) literature in the review.

Selecting Studies. Obtaining studies for review within two or more disciplines requires the development of specific criteria to be met by each study selected for the review. The operational definitions of the key concepts specified at the outset of the research provide the basis for developing these criteria. When related phenomena are being studied across disciplines, criteria are needed to indicate the features of the research (i.e., research designs, type of variables, analytical techniques) the researcher wishes to include in the review. Reviewers of research from across disciplines are confronted with the challenge of discovering authoritative sources of studies outside their own discipline.

Data Analysis. This phase of the review begins with confirmation that the studies chosen for review meet the selection criteria. Rather than a cursory review, confirmation requires the reviewer to examine each study in some detail to assure that all criteria are met. Several methods exist for analyzing data across studies. While the purpose of most reviews includes identifying patterns among studies, reviews should indicate whether these patterns are due to sampling and other methodological differences, or are truly a function of the phenomenon under investigation. Reviews of research across disciplines that seek to compare studies on a set of common criteria must specify what the criteria are, why they were chosen, and how each study will be analyzed in a reliable way against each criterion.

Cross-disciplinary Synthesis. As each study is analyzed, its findings are grouped by discipline. Within each discipline, the methods and findings of studies are compared and integrated in an effort to identify features of studies common to that discipline. Inferences made about studies from each disciplinary group are the findings of the review that, like the findings of primary research, can be applied to develop the research strategies of related disciplines.

Reporting the Results. In presenting the results of a research review, the reviewer is expected to integrate and summarize findings in a way that preserves the level of detail present in the primary research. Like primary research, research reviews should be replicable.

Table 1 summarizes the methodology for cross-disciplinary research reviews developed for this study. The right-hand column gives an example of a study in progress involving a cross-disciplinary critique of research across the disciplines of sociology, psychology, economics, management and HRD.

Table 1. Methodology for Cross-disciplinary Research Review

Research Phase	Research Task	Methods Used in this Study
1. Problem Formulation	• State research problem • Define key concepts • Define measures/operations	How can the strengths of the research strategies in other social science disciplines inform the development of research in HRD? Research study: Intervention: Organization/population outcome: Research strategy:
2. Determine Study Populations	• Specify unit(s) of analysis • Select disciplines Select specialization within disciplines • Include scholarly and non-scholarly literature	All units of analysis Human resource development Economics Sociology (organizational sociology, occupational sociology) Management (human resource management, organization behavior) Psychology (industrial/organizational psychology) Scholarly literature only
3. Select Studies	• Specify criteria for selection • Determine sources for studies • Confirm selection accuracy	Criteria for selection: A. Behavioral science interventions (usually the independent variables) must be discernible in the studies. B. Organization or population outcomes (usually the dependent variables) must be discernible in the studies. C. Some association or relationship between the interventions (A) and outcomes (B), though not necessarily a causal relationship, must be discernible in the studies. D. Exclude studies that focus exclusively on theory and theory development. The scope of the study might include theory, but should not be limited to it. E. Given the above criteria, select the best studies based on your judgment of the importance of their contributions to your discipline. (Studies can be in any form—journal articles, books, monographs, etc.) Sources for selecting studies:

		• Scholarly organizations in each discipline • Scholars in each discipline • Studies providing significant contributions to HRD Studies reviewed for the following components to confirm selection criteria were met: purpose, independent variable, dependent variable, research design, and results.
4. Data Analysis	• Develop analytical criteria • Assure reliability and validity of analysis	Criteria for analysis: • Scope: study addresses a broad range of related variables/issues ▪ Internal Generalizability: study has wide applicability across the discipline. • External Generalizability: study has wide applicability beyond the discipline. • Practical Importance: study offers multiple recommendations for the improvement of practice. • Theoretical Importance: study makes a new, significant theoretical contribution to the field. • Analytical Strength: appropriate methods for analyzing data are used and clearly described. Reliability: Multiple raters analyzed each study against criteria. Raters were "blind" to the discipline of each study and to the ratings of others. Validity: Each criterion applies equally to all disciplines from which studies were drawn. Each criterion addresses a desirable feature of research strategy.
5. Cross-Disciplinary synthesis	• Identify and compare research strategies of each discipline	Group results of data analysis by discipline. Integrate and summarize ratings on each criterion for: • Human resource development • Economics • Sociology • Management • Psychology Compare research strengths across disciplines

6. Report results	• Discuss research findings • Make recommendations	Report strengths of research strategies of each discipline. Recommendations for the development of research in HRD are based on the application of strengths from other disciplines that are relevant to HRD.

Table 2. Synthesis Matrix for Research Critique

Discipline	Scope	Internal Generalizability	External Generalizability	Practical Importance	Theoretical Importance	Analytical Strength
Human Resource Development						
Economics						
Sociology						
Management						
Psychology						

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Economics of Human Resource Development -Literature Review

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Economics of HRD is rarely found in HRD scholarly work, except the areas of cost benefit analysis in HRD. Human capital theory, screening theory, efficient wage model, internal labor market, agency theory, and transaction cost economics are reviewed and the implication of each theory for HRD are presented in the hope that traditional HRD functions can be expanded to include policy and strategy formulations.

It has been more than 25 years since HRD has been coined by Nadler (1970) and defined as a field by several scholars (McLagan, 1989; Nadler, 1970, 1990; University of Minnesota, 1994) in efforts to "emerge as a profession" (Watkins, 1989). The three underpinning areas of human resource development are considered to be economics, psychology and systems theory (Passmore, 1995; Swanson, 1995). Though both psychology and systems theory are, to a large extent, embedded in the areas of human resource development, an economic approach toward HRD or an integration between economics and HRD by HRD scholars is rarely found in HRD scholarly work, except the areas of cost benefit analysis or financial forecasting in human resource development.

In order to approach human resource development from an economic viewpoint, this paper reviews the evolutionary developments of human resource development, especially, in terms of HRD definitions. Second, along with a brief overview of the tenets and components of economics, economics of HRD, such as human capital theory, screening theory, efficient wage model, internal labor market, agency theory, and transaction cost economics is reviewed. Third, implications of each theory for HRD and contributions to HRD follow. Final section ends with results and conclusion.

Research Questions

The first research question is: What are the stream or trend of HRD? Second: What are the fields of economics in which scholars of HRD may take as an economic approach?
And third, What are the implications of each economic theory for HRD?

Trend of Human Resource Development

Human resource development is a newly emerging area of developing knowledge and expertise of human resources through the means of training and development. While there are overlapping areas between human resource management and human resource development, HRD is more concerned with development perspective and HRM with maintenance aspect of HR.

For over the last two decades, there have been efforts for both scholars and practitioners to define human resource development. The definition seems necessary if HRD is to emerge as a profession, as Watkins (1989) points out. Nadler (1970) is known for coining the term HRD and defines it as "a series of organized activities conducted within a specified time and designed to produce behavioral change" (p.3). Nadler (1990) changed the definition as "Organized learning experiences in a given period of time to bring about the possibility of performance change in the

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organization" (p. 1). The great transformation of the definition of HRD by Nadler over two decades is shown by the wordings from "organized activities...to produce behavioral change" to "Organized learning experiences...to bring about the possibility of performance change in the organization".

This change reflects the change in both external environment surrounding HRD and the knowledge base (refer to Jacob, 1990 for an interdisciplinary nature of HRD) that influence HRD practice. The intense global competition and accompanying interests in and efforts of enhancing organizational productivity seem to induce the transformation of an ultimate goal of HRD from behavioral change at an individual level to performance at an organizational level. Other scholars also support this trend to a large extent. In 1983, Chalofsky and Lincoln, focusing on behavioral change in individuals and groups, define HRD as "the study of how individuals and groups in organizations change through learning" (p. 20). In 1987, a task force of ASTD (McLagan, 1989) includes both individual and organizational performance in the definition of HRD, by defining HRD as "the integrated use of training and development, career development, and organizational development to improve individual and organizational effectiveness" (p. 7). In 1989, Watkins defines HRD in more comprehensive and strategic terms by stating HRD as "the field of study and practice responsible for the fostering of a long-term, work-related learning capacity at the individual, group, and organizational level of organizations" (p. 427).

A leading school of HRD (University of Minnesota, 1994), clarifies three different levels of HRD, such as an organization, process, and individuals, the purposes of HRD, the major tools to achieve the goals, such as organization development and training and development, and the critical application areas of human resource management, career development, and quality improvement. HRD is defined as

"a process of developing and/or unleashing human expertise through organization development (OD) and personnel training and development (T & D) for the purpose of improving performance".

In this way, the focus of HRD has evolved from the micro levels, such as learning at the individual or group levels to both the micro and macro levels, such as performance improvement at individual, process and organization levels. In the evolution process in defining HRD, the major tools to achieve the HRD goals, such as training and development and organizational development have been clarified, and the critical application areas of HRD, including human resource management, career development, and quality improvement have been positioned. The evolution process is expected to continue as far as external environments pressure organizations to depend on HRD as a means of improving organizational effectiveness, and more scholars from a variety of disciplines interact with HRD.

Economics of Human Resource Development

Economics, simply speaking, is a study on scarcity of resources. If there were abundant amounts of resources such as commodities and services, nobody would care about the way resources are spent. In such a situation, everybody could use the quantity he/she prefers to use, therefore, there might be no need for competition or control for resources. What an ideal society it would be! In reality, however, because there are more needs, demands and requests for particular resources than the supply, some ways of utilizing resources are sought and recommended. In short, according to Samuelson (1980), economics is a study of the way how to utilize limited resources efficiently. Economics as a discipline has a number of subdisciplines, such as microeconomics, macroeconomics, money and banking, labor economics, public finance, international economics, and etc. Among such subfields, labor economics is considered as a subfield that is closely related with HRD.

Economics of HRD is a rather unfamiliar term to HRD practitioners and scholars. To those practitioners who work at an operational level, an interface or an integration of both HRD

and economics may be more familiar. Literature review of major HRD journal (for instance, HRDQ) and the works done by HRD scholars reveal that a very few works (Gradous & Swanson, 1988; McLinden et al., 1993; Mosier, 1990) were done on the dimension of an integration of economics and HRD. Economics of HRD may go beyond this narrow category. It may deal with allocation issues of HRD funding or an impact of training and organization development on the organizational performance, as economics of education covers many issues, including income effects of education and allocation of education funds. Reflecting on the current changes in environments, such as intense international competition and a survival strategy, the economic dimension is considered to be more emphasized than ever. It is expected that an examination of economic theories will expand the scope of an integration of economics and HRD.

Human Capital Theory. The origin of economics of HRD traces back to labor economics in general sense and Becker's human capital theory in specific sense. Human capital theory is considered as the most closely related field to HRD, specifically training. Theodore Schultz (1961) in his presentation to American Economic Association appears to be the first to present scholarly research regarding the return on investment in human capital, thus providing an impetus to economists to address linkages between education, training, human development and productivity. While labor is considered as a commodity which can be sold and bought, human capital refers to knowledge, expertise and skills accumulated through education and training. The concept of human capital is considered as a more elaborated and developed one than the term of labor. Human capital is considered to enhance his or her ability to carry out tasks in the organization through embodied knowledge and skills. The term of human resource is more comprehensive than labor and human capital in that human resource may stand for personalized skills, knowledge, expertise, and experiences that have been accumulated in individuals.

Becker (1964) is usually credited as the first to identify and term "human capital theory". According to Becker, human capital is classified into both firm-specific human capital and general-purpose human capital. Milgrom and Roberts (1992) illustrate two different kinds of human capital as follows. The firm-specific human capital can be obtained through training of the idiosyncrasies of the particular firm's machinery or its accounting system, the special terminology and decision procedures used in particular firms. The general-purpose human capital can be obtained through education of how to operate a type of machine or prepare accounting statements, a familiarity with general business terminology and procedures, and general skills in sales and marketing. Human capital theory views the employees' education, skills, knowledge and expertise obtained through training as the major source of enhanced productivity to both the firm and the general economy. Therefore, investments in human capital can have significant effects on the income of the individuals and the productivity of firms.

One of the contributions of human capital theory is to explicitly recognize that the labor market deals with a long-term relationship. Investment in specific human capital, by allowing employers to invest in employees and providing employees with incentives to stay with employers, contributes to a long-term employment relationship.

Screening theory and Signaling Model. While human capital theory focuses on developing knowledge, expertise and skills accumulated through training and education required for jobs, the screening theory and job signaling help individuals seek the employment opportunities. In this way, potential job applicants' skill and knowledge may be better matched with the jobs. Phelps (1972), Arrow (1973), Spence (1973, 1974) and Thurow (1972, 1975) developed the screening or signaling theories. These models suggest that education or training can play a signaling or screening role in the job market with better-educated workers becoming employed in higher-paying positions. As a result, education has a positive association with earnings for the individual household as well as for the firm.

The signaling models of Spence (1973, 1974) and Arrow (1973) are based on three assumptions. First, employers may pay higher wages to better-educated employees even if education has no effect on productivity. Second, ability is assumed to have a positive correlation with productivity. The third assumption is that workers of higher ability can invest in education

more cheaply than those of lower ability. There are two versions of interpretation in the screening hypothesis (Strober, 1990). The stronger version takes the view, on the one hand, that education has nothing to do with productivity and schools do nothing more than play as a filtering role. The weaker version is that the role of schooling, to some extent, plays as a screen or signal in labor markets where imperfect information exists about productivity.

Efficiency Wage Model. The essence of efficiency wage theory (Yellen, 1984) reports that employers seek employees with high wages (termed efficiency wages) in order to reduce employee turnover, replacement, and monitoring costs. That is, when employers face high turnover costs or high monitoring costs, they devise wage systems that provide incentives for employees to stay with the firm and to continue to remain productive. This theory challenges human capital theory with respect to the connections between experience and productivity and between productivity and earnings. The notion that employee earnings increase with seniority because of employers' need to provide employee incentives challenges the human capital view that earnings rise with experience (seniority) because they mirror employees' productivity increases that result from job-specific training. Also, the efficiency wage notion blurs the connections among on-the-job training, productivity and earnings proposed by human capital theory because even if on-the-job training (seniority) does increase productivity, employer incentive wage schemes may obscure the connection.

Internal Labor Market Theories. Internal labor market theories are based on Doerringer and Pierre (1971), who challenges the free market principle based on demand and supply. While external labor markets set wages based on supply and demand, internal labor markets set wages based on administrative rules, procedures and convenience. These two markets are connected through certain jobs that provide ports of entry to the internal labor market. Jobs that are not entry level are not filled from the external market but through promotion and transfer of those who are already employed by the firm. The wage rates for jobs in the internal labor market are not, therefore, directly affected by competition in the external labor market.

While management increases company loyalty and reduces turnover by providing employees with better wages under efficiency wage theory, promotion of long-service employees into high-on-the-ladders, high paying jobs is considered as an earnings carrot under internal labor market theory. Human resource or industrial managers under internal labor market are given great power because their decision making ranges from how much on-the-job training to provide and how to share the costs with employees, to which jobs are assigned to which job ladders, how wide or narrow the earnings differentials are between job ladder "rungs", how much, if any, cross-over there is among job ladders, and which jobs to redesign and which to contract out (Strober, 1990).

Agency Theory. Under agency theory, derived from the study of organizations, a major question is concerned with how organizations of self-interested individuals with conflicting goals behave within the constraint of incomplete information regarding the competitive economic markets in which the firm must operate. The assumptions underlying the agency theory are as follows: first, everybody knows the goals and objectives of all individuals. Second, uncertainty prevails, i.e., the relationship between cause and effect is not known. Third, the agent knows some events that the principal does not (Levinthal, 1988). In this model, the principals in the organization (for example, an owner) offer incentive and monitor performance of agents (for instance, managers) so that the latter work for the interests of the former.

Transaction Cost Economics. A pioneer of transaction cost economics (Hart, 1989; Williamson, 1985) examined the costs that accompany any transaction and tried to examine if the firm could lower its transaction costs by undertaking them within rather than without the firm. The transaction costs, such as thinking, planning and contracting costs are usually ignored by the neoclassical paradigm. The essence of this theory is that in some cases these costs will be lower if a transaction is carried out within a firm rather than in the market. This is because transactions are organized in such a way to economize bounded rationality while simultaneously protecting those transactions against the risks of opportunistic behavior.

Implications of Each Theory for Human Resource Development

Human capital theory focuses on training among the areas of human resource development. Many training researches focuses on transfer of training (Baldwin & Ford, 1988), training methods (Bretz & Thompsett, 1992), training evaluation design (Sackett & Mullen, 1993) and trainee motivation (Noe & Schmitt, 1986). A major contribution of human capital theory to training research would be to offer the organization with implications of the scope, method and funding sources of training by estimating the effects of training on individual productivity or income.

Screening theory or signaling model is more concerned with selection than training and development. Screening is, on the one hand, considered to be a distinct concept from HRD because selection of employees is perceived as a separate activity from training and development. Under this continuum, both selection and training and development are considered to have a separate impact on job performance. From employee perspective, screening theory helps individuals seek the employment opportunities, which may better match potential job applicants' skills and knowledge. From employers' viewpoint, screening is, on the other hand, considered as the pre-stage of human resource development because selection of best candidates is considered to be instrumental in obtaining maximal efficiency of training and development for employee's in particular jobs. In the middle lies the view that both screening and training and development complement with each other in improving organizational performance.

The firms who offer efficiency wages to their employees tend to be at least medium-sized firms. The firms characterized by a large amount of resources and capital are likely to offer higher wages and to present more opportunities for training and development in order to seek and maintain competent employees within their firms than small to medium-sized firms. Conversely, firms that do not offer efficiency wages are featured by high employee turnover and face little investment in training and development. With some exceptions, some firms may offer the valuable opportunities for training and development, by providing firm-specific training instead of efficiency wages. However, these implications need to be tested empirically.

In an organization dominated by an internal labor market, employers place a high value on developing their human resources through increased investment in training and development. However, internal labor market has nothing to do with entry-level employees. It is concerned with employees of seniority in the sense that promotion of long-service employees into high-level, high paying jobs in the hierarchy is provided to employees as an incentive designed to enhance company loyalty and to reduce turnover. Therefore, in internal labor market, a high level of in-house training and employee development structure and systems is considered as an essential part of the system than external labor market through which most entry-level employees are employed.

The main interests of agency theory lie in monitoring and controlling agents so that agents can contribute to the interests of the principals. However, there is still room to think HRD in terms of agency perspective. Let us focus on the interests of the whole organization, including profits and shareholder's gains. Training can be considered as a tool, which unleashes individual skill and expertise to improve organizational performance. The owners as principals would be more interested in and invest in firm-specific training rather than general training. This is because general training is transferable to other firms and other settings, so those employees with high human capital through general training tend to move to other organizations. Besides, agency theory might provide the HRD managers with the insights of devising incentive and compensation schemes to complement with the career development.

The implications of transaction cost economics may provide HRD managers with a guide in choosing training and development programs out of external markets or internal organizations. This is because choice between external outsourcing and internal sources to a large extent, depends on transaction costs, such as thinking, scheduling, negotiation, and enforcement costs.

Conclusion

An economic approach toward HRD or an integration between economics and HRD by HRD scholars is rarely found in HRD scholarly work, except the areas of cost benefit analysis or financial forecasting in human resource development. However, examining the evolution of HRD, the focus of HRD has evolved from the micro levels, such as learning at the individual or group levels, to both the micro and macro levels, such as performance improvement at individual, process and organization levels. Although each theory has its own implications for HRD, practitioners and scholars equipped with economics of HRD are expected to have cost-consciousness of HRD programs and institutions, first of all. Understanding of the efficient use of resources, operation of labor market, and market mechanism might be by-product learned from economics of HRD. Efficiency wage model and agency theory might provide HRD practitioners and scholars with new perspective about employee turnover, monitoring, and an incentive system. Screening theory and internal labor market theories are expected to give practitioners new vision about selection of employees, in-house training and career development.

Contribution to Human Resource Development

An economic analysis of HRD phenomenon, essentially includes a macro level, at least at an organizational approach, so that it enables HRD practitioners to understand the competing costs and benefits to the organization and to the individuals. Second, an economic approach allows us to get beyond activities or program at the operational levels to discover strategies and policies, or long-term implications of actions, activities and programs. When HRD practitioners are trained to analyze issues for their long-term implications, they are able to develop policies and strategies that will enhance individuals' skills, knowledge, and ability as well as organizational processes and effectiveness. HRD practitioners equipped with an economic perspective will be better prepared to educate employees in the organization's views so that employees' mistrust about management will be reduced. Third, through the above channels, the scope of traditional HRD functions can be expanded to include policy and strategy formulations, which role has been largely neglected by HRD practitioners, scholars and consultants.

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